

is thus doing a service to the nation, as well as extending interest in natural knowledge. Dr. P. Bedson, professor of chemistry at the Durham College of Science, has, we are glad to see, recently shown the Economic Society of Newcastle-on-Tyne some of the lessons taught by the growth of science and industry in Germany during the present century. A reasonable and organised system of education, and schools in which students receive a thorough grounding in the principles of science, and afterwards contribute something to the advancement of knowledge, are the chief factors in Germany's industrial progress. Referring to the system of examinations which still dominates so much of our educational work, and finds its highest development in connection with university teaching, Prof. Bedson points out that it partakes of the character of the training of a stud of racers. He adds:—"Possibly the instinct of sport, so characteristic of the English people, it is which commends the system of competitive examination. Too much is made of what should be regarded as a minor duty of the University, viz. the testing and marking of its students, and too little of the higher function, the training of students under first-rate teaching, with the object that those so trained should help forward the advancement of knowledge." It is satisfactory to know that the movement in favour of rational teaching in elementary schools, and regard for research in institutions of university rank, is gradually affecting scientific education in this country.

SCIENTIFIC SERIALS.

Symons's Monthly Meteorological Magazine, July.—This number contains the completion of two interesting papers, by Mr. E. D. Archibald, on Indian famine-causing droughts, and their prevision. The principal facts are summarised as follows: (1) Extensive droughts occur in the dry area of Southern India at intervals of nine to twelve years, and usually, but not regularly, about a year before the sun-spot minimum. When the conditions are sufficiently acute, famine occurs in the following year. (2) A severe drought in the peninsular of Southern India is followed by a severe drought and ensuing famine in Northern India in about five cases out of seven. (3) Summer droughts tend to occur in Northern India in years of maximum sun-spot, connected in some way with the abnormal high pressure over Western Asia which prevails at such epochs. There is thus a double periodicity of droughts and famine in North India, and a single periodicity in South India in the sun-spot cycle, though the relation between the phenomena is too spasmodic and irregular to be utilised as a trustworthy factor for prevision.

Annalen der Physik, No. 6.—Interruption spark in the alternating circuit with metallic electrodes, by L. Kallir. The author shows that the impossibility of producing an alternate-current arc between metallic electrodes is due to the fact that the spark is confined to one semi-period of the current. Or if it extends over several periods, it is intermittent, and only appears at every alternate semi-period.—Thermoelectric force of some metallic oxides and sulphides, by A. Abt. Pyrolusite, pyrrhotite, pyrites, and chalcopyrite were used in conjunction with various metals or with each other. A pyrites-chalcopyrite couple gave an E.M.F. 10·8 times as high as an antimony-bismuth couple under the same conditions.—Anomalous electromagnetic rotatory dispersion, by A. Schmauss. Measurements of the Faraday effect for various wave-lengths in fuchsine solutions and in didymium glass justify the general conclusion that optical anomaly in dispersion is invariably associated with a corresponding electromagnetic anomaly. In strongly absorbing media the anomaly extends for a considerable distance on both sides of the absorption band, and it increases with the concentration and with the narrowness and sharpness of the absorption band.—Point discharges, by E. Warburg. In carefully purified nitrogen, the current intensity obtained from the discharge of a fine point charged to - 3310 volts is 200 times as great as from a point charged to + 5180 volts. A slight admixture of oxygen reduces the proportion to 4:1.—Band spectrum of aluminium, by G. A. Hemsalech. The author quotes some experiments which go to show that the band spectrum of aluminium is due, not to the oxide, but to the metal itself.—Behaviour of radium at low temperatures, by O. Behrendsen. Cooling a radium preparation down to the temperature of liquid air reduces its activity by 50 per cent. Restoration to the ordinary temperature produces a considerable but transient increase of activity.—Production of kathode rays by ultra-violet light, by P. Lenard. The discharge of electrified

bodies by ultra-violet light is due to their emitting kathode rays when the ultra-violet light impinges upon them. The author exhausted a vacuum tube until it no longer allowed any discharge to pass. He then exposed the kathode to ultra-violet rays from a zinc spark gap. The discharge set in again immediately, but no discharge could be obtained by similarly illuminating the anode. The rays which produce the discharge across the absolute vacuum can be deflected by a magnet, and their velocity is about one-thirtieth of the velocity of light.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 8.—"On Electric Touch and the Molecular Changes produced in Matter by Electric Waves." By Jagadis Chunder Bose, M.A., D.Sc., Professor of Physical Science, Presidency College, Calcutta. Communicated by Lord Rayleigh, F.R.S.

It is claimed that the experiments described in the paper show:—

- (1) That ether waves produce molecular changes in matter.
- (2) That the molecular or allotropic changes are attended with changes of electric conductivity, and this explains the action of the so-called coherers.
- (3) That there are two classes of substances, positive and negative, which exhibit opposite variations of conductivity under the action of radiation.
- (4) That the production of a particular allotropic modification depends on the intensity and duration of incident electric radiation.
- (5) That the continuous action of radiation produces oscillatory changes in the molecular structure.
- (6) That these periodic changes are evidenced by the corresponding electric reversals.
- (7) That the "fatigue" is due to the presence of the "radiation product," or strained B variety.
- (8) That by means of mechanical disturbance or heat, the strained product can be transformed into the normal form, and the sensitiveness may thereby be restored.

June 21.—"An Experimental Investigation into the Flow of Marble." By Frank D. Adams, M.Sc., Ph.D., Professor of Geology in McGill University, Montreal, and John T. Nicolson, D.Sc., M.Inst.C.E., Head of the Engineering Department, Municipal Technical School, Manchester. Communicated by Prof. H. L. Callendar, F.R.S.

The following is a summary of the results arrived at:—

- (1) By submitting limestone or marble to differential pressures exceeding the elastic limit of the rock and under the conditions described in this paper, permanent deformation can be produced.
- (2) This deformation, when carried out at ordinary temperatures, is due in part to a cataclastic structure and in part to twinning and gliding movements in the individual crystals comprising the rock.
- (3) Both of these structures are seen in contorted limestones and marbles in nature.
- (4) When the deformation is carried out at 300° C. or better at 400° C., the cataclastic structure is not developed, and the whole movement is due to changes in the shape of the component calcite crystals by twinning and gliding.
- (5) This latter movement is identical with that produced in metals by squeezing or hammering, a movement which in metals, as a general rule, as in marble, is facilitated by increase of temperature.
- (6) There is therefore a flow of marble just as there is a flow of metals, under suitable conditions of pressure.
- (7) The movement is also identical with that seen in glacial ice, although in the latter case the movement may not be entirely of this character.
- (8) In these experiments the presence of water was not observed to exert any influence.
- (9) It is believed, from the results of other experiments now being carried out but not yet completed, that similar movements can, to a certain extent at least, be induced in granite and other harder crystalline rocks.

"On the Effects of Changes of Temperature on the Elasticities and Internal Viscosity of Metal Wires." By Andrew Gray, LL.D., F.R.S., Professor of Natural Philosophy in the University of Glasgow, and Vincent J. Blyth, M.A., and

James S. Dunlop, M.A., B.Sc., Houldsworth Research Students in the University of Glasgow.

"The Distribution of Molecular Energy." By J. H. Jeans, B.A. Communicated by Prof. J. J. Thomson, F.R.S.

PARIS.

Academy of Sciences, July 23.—M. Maurice Lévy in the chair.—Notice on Charles Friedel, by M. Georges Lemoine.—Visual observations of the corona of May 28, made by Mr. W. H. Wesley at Algiers, with the Coudé equatorial of 0.318 metre aperture, by M. Loëwy.—Phosphoric acid in the presence of saturated solutions of calcium bicarbonate, by M. Th. Schloesing. Solutions of phosphoric acid were added to saturated solutions of calcium bicarbonate, and carbon dioxide withdrawn by a slow current of air. From the analyses of the precipitated salt, interesting conclusions are drawn as to the use of superphosphates as manure.—Report upon the proposed revision of the arc of the meridian at Quito, by M. Poincaré. The Commission report that it is of opinion that the proposed revision of the arc of meridian at Quito should be carried out. The arc measured should be 6° instead of 4° 5', the work being done by the staff of the Geographical Service of the Army under the control of the Academy of Sciences.—On the limited problem of three bodies, by M. Lévi-Civita.—On the position and actual appearance of a new star, transformed into a nebula, by M. G. Bigourdan. The nebular constitution ascribed by Prof. Pickering to this new star, discovered by Mrs. Fleming, must have been derived from spectroscopic examination, since at the present time the object appears clearly as a star, without any trace of nebulosity.—Total eclipse of the sun of May 28. Note on the observations made at the Observatory of Algiers, by W. H. Wesley. A description of the study of the lower coronal regions.—Observations of the total eclipse of the sun of May 28, made in Spain, at Hellin, Albacete, and at Las Minas, by M. G. Bigourdan.—Observation of the solar eclipse of May 28, made at Albacete, in Spain, by M. J. Eysséric.—Observation of the total eclipse of the sun of May 28, at Las Minas, in Spain, by M. Salet.—On a system of differential equations equivalent to the problem of n bodies, but admitting of one more integral, by M. W. Ebert.—On the elastic flying machine, by M. L. Lecornu.—On the electrocapillary functions of aqueous solutions, by M. Gouy.—The spectrum of radium, by M. Eug. Demarçay. M^{me}. Curie has succeeded in obtaining a specimen of radium chloride in which the barium is so far reduced that only a feeble spectrum of three principal rays is obtained. The radium lines, although much stronger than in the specimens previously studied, show no new ray that can be attributed to radium. In its general character the spectrum of radium approximates to those of the metals of the alkaline earths.—Solubility of a mixture of salts having a common ion, by M. Charles Touren.—On a new complex acid and its salts, palladio oxalic acid and palladio-oxalates, by M. H. Loiseleur. Four new substances are described, palladio-oxalic acid and its silver, sodium, and barium salts. The acid is the first complex acid containing palladium that has been isolated.—On some osmyloxalates, by M. Wintrebort.—Action of some finely divided metals, platinum, cobalt and iron, upon acetylene and ethylene, by MM. Paul Sabatier and J. B. Senderens. Platinum black has no action upon pure acetylene at ordinary temperatures, but at 150° ethylene and hydrogen, together with small quantities of benzene and ethane, are produced. With cobalt, the reaction commences at 200°, ethane and hydrogen being the principal products. Iron behaves similarly to cobalt. With ethylene, platinum and copper produce practically no effect; cobalt gives ethane, hydrogen and methane, and similarly with iron.—Synthesis of paramethoxyhydratropic acid, by M. J. Bougault. The author concludes that in identifying phloretic acid with the synthetical paraoxyhydratropic acid, M. Trinius was in error.—Influence of hydrobromic acid upon the velocity of the reaction of bromine upon trimethylene, by M. G. Gustavson.—The organic solutions of ferric chloride, by M. Cehsner de Coninck. The iron salt is removed from solutions in methyl and ethyl alcohols, acetic ether and acetone by repeated filtration through animal charcoal.—On the nature of the reserve carbohydrates of the St. Ignatius bean and nux vomica, by MM. Em. Bourquelot and J. Laurent. The albumen of these seeds appears to contain several mannane and galactanes of different molecular weights.—On the genera Palythoa and Epizoanthus, by M. Louis Roule.—A teratological process, by M. Étienne Rabaud.—The nepheline rocks of the

Puy de Saint-Sandoux, by M. A. Lacroix.—The sub-Pyreneal erosions, by M. L. A. Fabre.—On the existence of carboniferous strata in the region of Igli, by M. Ficheur.—On the agglutination of blood corpuscles by chemical agents, and on the conditions of medium which favour or prevent it, by M. E. Hédon.—On the influence of phosphates and of some other mineral substances upon the proteolytic diastase of malt, by MM. A. Fernbach and L. Hubert.—The bacteriolysis of anthrax, by M. G. Malfitano.—On the function of the nucleus in the formation of hæmoglobin and in cellular protection, by M. Henri Stassano.—On the collection of potable water and protection of springs, by M. Léon Janet.

CAPE TOWN.

South African Philosophical Society, June 27.—L. Péringuey, President, in the chair.—Mr. E. H. L. Schwarz exhibited copies of some Bushman drawings which he had found near Nieuwoudtsville. Along with the usual reproductions of men and animals, there are certain puzzling figures which have not been recorded from other localities. One of these consists of a rude slipper-like form with seven bars across it; another is a circle with seven peripheral radiating bars, and a third shows three concentric circles, from the outer of which there extend twenty-one bars. Mr. Schwarz thought that the first-mentioned figure might be a tally.—Dr. Corstorphine gave a short note on an old beach deposit on the site of the South African Brewery at Woodstock, which had been brought to his notice by Mr. A. W. Ackermann, architect, Cape Town. Some of the sections show a layer of shells and water-worn boulders some three feet thick resting on the slate and covered by about three feet of sand and soil, but within thirty yards the deposit entirely thins out. The shells all belong to species found on the present beach.—A copy of a report on a submarine disturbance, from the magistrate at Walfish Bay, forwarded by Major Stanford, was read by the secretary. The magistrate stated that on May 31 or June 1 last, a new island appeared about 100 yards N.E. of Pelican Point. The island was about 150 feet long by 30 feet wide, and stood 12 feet above high water. It was composed of a tenacious clay; soundings gave 7–10 fathoms around it; steam was observed rising from the clay, and an intense smell of sulphuretted hydrogen was perceptible, even at a distance of five miles.—Mr. Sclater gave an account of some inscribed stones found in Cape Town.

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